

*Sargassum Wightii.*

Fig. 1. Portion of a branch.

- 2, 2. Leaves and vesicles from a young specimen.
- 3. Raceme of fructification as sometimes seen terminating the branches.
- 4. Portion of a raceme in its more compact form.
- 5. Portion of do. as seen in fig. 3.
- 6. Vesicle. 4 & 5 magnified.

*Sargassum cervicorne.*

Fig. 1. One of the fertile ramuli, and leaf given off at the base of a branch.

- 2. Leaf from a young plant with vesicles.
- 3. Do. from towards the upper part of same plant.
- 4. Vesicles.
- 5. Receptacles as they are developed on one specimen.
- 6. Do. The last magnified.

XXV.—On the *Gonidia* of Lichens. By G. H. K. THWAITES, Lecturer on Botany and Vegetable Physiology at the Bristol Medical School.

[With a Plate.]

THERE appears to have been much uncertainty felt by those who have devoted their attention to the study of the Lichens, as to the real character of those spherical or subspherical green bodies which are characteristic of true Lichens, and to which the name of *gonidia* has been given, from the circumstance of their capability of becoming developed into new plants when separated from the parent structure. Every one who has examined carefully the *thallus* of a Lichen under a tolerably high power of the microscope, must have been struck by the peculiar appearance of the *gonidia*, as compared with ordinary cellular structure:—the frequent irregularity in their form—their want of correspondence in size—their slight attachment to each other, or to the filamentous tissue surrounding them, and their aggregation in certain parts of the structure—must have taken the attention of any observer who has been much accustomed to the examination of vegetable structures. These peculiarities indeed gave rise to a strong desire on my part to ascertain the real character of *gonidia*, and after examining a great number of species, both of true Lichens and of the genus *Collema*, and plants allied to it, I am able with confidence to state what is the true character of *gonidia*. It is pretty generally known that the *thallus* of *Collema* consists of a number of moniliform filaments, and also of delicate anastomosing cylindrical filaments immersed in a more or less firm gelatine. When examined more carefully the structure is found to consist of numerous Nostoc-like vesicles closely cohering, and among which ramify the anastomosing filaments. The cellular

cuticle which invests the *thallus* of some species of *Collema*, or rather of *Leptogium*, Fr., is a modification only of the anastomosing filaments, as can be proved from the structure of some allied plants.

What has just been stated may be considered a description of the ordinary structure of *Collema* and *Leptogium*, but in *Collema nigrum* we find each frond corresponding to a single nostoc-vesicle, which becomes invested with a cellular cuticle, and has external to this the characteristic anastomosing filaments, which, with those of other similar fronds, go to form the filamentous substratum or kind of thallus upon which the fronds of this species are situated. In the true Lichens is to be traced a very similar structure, only that instead of nostoc-vesicles we find groups of cells very nearly resembling those of the genus *Pleurococcus*, Meneghini, and around these cells, which increase in number by continual subdivision, anastomosing filaments or modifications of them become developed, just as takes place in *Collema nigrum*; indeed so great is the resemblance between the small fronds of that species and a state I have found of *Biatora vernalis*, as to have at first made me suppose they were immediately allied to each other.

From the above then it is clear, that the *gonidia* of a Lichen are the analogues as regards their functions of the nostoc-vesicles of *Collema*, and this view enables us to understand what previously appeared an anomalous character in these organs. The *gonidia* are in fact the *essential* part of the whole structure, and can scarcely be considered as *gemmæ*, except when under certain circumstances they put on that character, just as ordinary cells do in other plants.

The other elements of the Lichen-thallus may without difficulty be believed to represent modifications of the anastomosing filaments of *Collema*, which no doubt they are.

It is thus shown that between *Collema* and the true Lichens there subsists a close though not an immediate affinity, the essential part of the *former* being represented by the genus *Nostoc*, and of the *latter* by the genus *Pleurococcus*.

There are other plants bearing considerable external resemblance to those we have been describing, but which are represented, as respects their *essential* structure, by other genera of the lower Algæ. Among such may be mentioned *Synalissa vulgaris*, Fr., first gathered in this country by Mr. Borrer, who found it growing upon St. Vincent's Rocks: externally this little plant much resembles a *Collema*, but an examination of its internal substance under the microscope exhibits to us a structure very like that of the genus *Coccochloris*: a number of single cells (or binate, when undergoing subdivision) are scattered throughout

the gelatinous substance of the plant, and most thickly towards the periphery of the cylindrical branches of the fronds. Each cell is found, upon a careful inspection, to be surrounded by its definite amount of gelatine, and to be situated at the extremity of an ultimate ramification of the numerous somewhat anastomosing filaments which pervade the whole mass of the plant (Pl. VIII. A. fig. 2). The genus *Paulia*, Fée, a species of which (*Paulia perforata*, Mont. MSS.) has, at the request of Mr. Berkeley, been kindly sent for my inspection by Dr. Montagne, possesses an internal structure precisely similar in character to that of *Synalissa*. The asci of *Synalissa vulgaris* contain numerous perfectly spherical sporidia: I could not detect any apothecia in Dr. Montagne's specimen of *Paulia*. The genus *Lichina* is immediately allied to *Stigonema* (*Ephebe*, Fr.), and the whole structure is very different from that of *Paulia*, as I have ascertained from the examination of freshly-gathered specimens of the former recently sent me by Prof. Harvey.

Whilst writing on this subject, I may mention another very interesting plant, which, in the texture of its frond and character of its fructification, exhibits some analogy to *Collema*. I allude to *Mastodia tessellata*, Flor. Ant., for a sight of specimens of which I have been indebted to the kindness of Professor Harvey and Mr. Berkeley. The essential structure of this plant is represented by the genus *Ulva* (especially *Ulva crispa*), but it possesses apothecia containing asci, though the latter organs appear to have escaped the observation of the excellent botanists who described the plant, owing to the sporidia so soon becoming free.

We have thus then offered to our view plants which, judging from their external appearance alone, would be arranged together in one undivided group, and even in some cases in the same genus, exhibiting nevertheless totally different types of structure. They are as follows:—

1. The *Lichens* proper ;
2. *Collema*, *Leptogium*, &c. ;
3. *Synalissa* and *Paulia* ;
4. *Mastodia* ;

represented respectively, as regards their essential fundamental structure, by the genera *Pleurococcus*, *Nostoc*, *Coccochloris* and *Ulva* (*U. crispa*), which are usually placed very near together in a natural arrangement ; but the circumstance of their each impressing a character, upon being a bond of union, as it were, to plants higher in the scale of vegetation, will doubtless, if well considered, furnish a key to the proper arrangement of species closely allied to and of equally low development with them.

It is highly interesting to observe in these lower plants a typical character of essential structure binding together nume-

rous species of various forms, and enabling us to distinguish at once in other species resemblances of analogy from those of affinity: so true is it that in the smallest natural groups of organized structures the same great principles are to be discovered, when carefully sought for, which exhibit themselves so obviously in the larger divisions of the Kingdom of Nature.

EXPLANATION OF PLATE VIII. A.

- Fig. 1.* Portion of a plant of *Synalissa vulgaris*, Fr., slightly magnified.  
 — 2. Small portion of the internal substance of the frond, showing the arrangement of the cells, and their attachment to the branched filaments. Magnified 270 linear.  
 — 3. Asci and paraphyses of *Synalissa vulgaris*. Magnified 270 linear.

BIBLIOGRAPHICAL NOTICES.

*Illustrations of the Proceedings of the Zoological Society of London.*  
 Part I. January—April. 1848. 8vo.

WE hail with hearty welcome this most noble addition to the illustrated periodical zoological works of our country, and hope that it may meet with that liberal encouragement which will induce Mr. Mitchell, the able Secretary to the Zoological Society, to persevere in its publication. It is really a very handsome work, and independently of its scientific value, we must say that to the general lover of the works of an allwise Creator, this book must prove singularly pleasing. There is a very happy selection of subjects—something to please everybody.

Mammalia are represented in

*Galidictis vittata*, J. E. Gray, well drawn and lithographed by Mr. B. W. Hawkins. This animal belongs to the same family as the weasels, and is described by Mr. Gray from a specimen in the British Museum, now so rich in its collection of mammalia.

*Ptilocercus Lowii*, J. E. Gray, drawn and lithographed by Mr. Wolf. A very beautiful and singular insectivorous quadruped, organized for an arboreal life by its singular pen-shaped tail, with its two vanes, so suited to balance the little creature; it was discovered by Mr. Hugh Low, Colonial Secretary, Borneo, in the woods of that island; we hope the enterprising Secretary of the Zoological Society may succeed in getting from Borneo live specimens of this and other zoological productions of the Indian Archipelago.

Of Birds there are figured

*Coracopsis? personata*, G. R. Gray, a fine new species of Parrot, now in the noble collection of the Earl of Derby, President of the Zoological Society; it is figured by Mr. B. W. Hawkins.—*Trochilus (Helianthus) Mavors*, Gould. Mr. Richter has figured this and the next plate (our favourite) of these “children or messengers of the sun,” as some one has pleasingly named the Humming-bird,—*Trochilus (Helianthea) Eos*, Gould, a most gorgeous bird, and most admirably